

# Simulation of electron moving in RF capacitively coupled discharge

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## Abstract

© 2018 Institute of Physics Publishing. All rights reserved. An algorithm of simulation of kinetic movement of electrons in alternating-current field of radio-frequency capacitively coupled discharge is presented in the paper. The results of solving of modelling problems are presented also.

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## References

- [1] Chebakova V Yu 2017 Modeling of Radio-Frequency Capacitive Discharge under Atmospheric Pressure in Argon Lobachevskii Journal of Mathematics 38 1165-78
- [2] Askhatov R M, Chebakova V Yu and Zheltukhin V S 2016 Capacitive coupled RF discharge: modelling at the local and not local statement of the problem IOP Conf. Series: Materials Science and Engineering 158 012009
- [3] Hagelaar G J M and Pitchford L C 2005 Solving the Boltzmann equation to obtain electron transport coefficients and rate coefficients for fluid models Plasma Sources Sci. Technol 14 722-33
- [4] Pareschi L, Russo G and Toscani G 2000 Fast spectral methods for the Fokker-Planck-Landau collision operator Journal of Computational Physics 165 216-36
- [5] Karpova S A, Potapenkova I F and Bobylev A V 2017 On the accuracy of the direct discrete simulation of the Landau collision integral by the Boltzmann integral Mathematical Models and Computer Simulations 9 206-20
- [6] Bobylev A V and Potapenko I F 2013 Monte Carlo methods and their analysis for Coulomb collisions in multicomponent plasmas Journal of Computational Physics 246 123-44
- [7] Sysun V, Sysun A, Ignakhin V, Titov V and Tikhomirov A 2014 Comparison of Simulation Methods of Ion-Atomic Collisions in PIC-MC Journal of Applied Mathematics and Physics 2 1233-41
- [8] Demkin V P and Mel'nichuk S V 2013 Monte-Carlo calculation of the electron energy distribution function of a He-N<sub>2</sub> plasma of a high voltage pulsed discharge Russian Physics Journal 56 486-8
- [9] Ponomarev A A and Aleksandrov N L 2017 The kinetics of energetic O<sup>-</sup> ions in discharge H<sub>2</sub>O plasma IOP Conf. Series: Journal of Physics: Conf. Series 927 012044
- [10] Savino Longo 2000 Monte Carlo models of electron and ion transport in non-equilibrium plasmas Plasma Sources Sci. Technol. 9 448-76
- [11] Bobylev A V., Potapenko I F and Karpov S A 2012 DSMC Methods for Multicomponent Plasmas AIP Conference Proceedings 1501 541-8
- [12] Karpov S A, Potapenko I F and Bobylev A V 2014 Monte Carlo simulation of the kinetic collisional equation with external fields Mathematical Models and Computer Simulations 6 598-611
- [13] Kashapov N F, Saifutdinov A I and Fadeev S A 2014 The model of the positive column of a glow discharge with the influence of the acoustic oscillations Journal of Physics: Conference Series 567 012004
- [14] Akhatov M F, Gaisin F M, Iskhakov F R, Kayumov R R, Kuputdinova A I, Mukhametov R A and Shpilev A I 2017 Influence of composition of electrolyte on electric discharge in Liquid IOP Conf. Series: Journal of Physics: Conf. Series 927 012002

- [15] Gaisin A F 2016 A multichannel discharge between a stream electrolytic cathode and a metal anode at atmospheric pressure High Temperature 44 336-41
- [16] Saifutdinov A I, Saifutdinova A A, Kashapov N F and Fadeev S A 2016 Dynamics contraction of DC glow discharge in argon Journal of Physics: Conference Series 669 012045
- [17] Fadeev S A and Kashapov N F 2013 The influence of transverse acoustic oscillations on contraction of the glow discharge J. Phys.: Conf. Ser. 479 012009
- [18] Yousfi M, Hennad A and Alkaf A 1994 Monte Carlo simulation of electron swarms at low reduced electric fields Physical Review E 49 3264-73
- [19] Hans Rau 2000 Monte Carlo simulation of a microwave plasma in hydrogen J. Phys. D: Appl. Phys. 33 3214-22
- [20] Gabbasov F G, Dubrovin V T and Chebakova V J 2016 Vector random fields in mathematical modelling of electron motion IOP Conf. Series: Materials Science and Engineering 158 012032
- [21] Badriev I B, Zheltukhin V S and Chebakova V Ju 2017 Numerical solution of the initial boundary value problems of radio - frequency capacitive coupled discharge IOP Conf. Series: Journal of Physics: Conf.Series 927 012008